

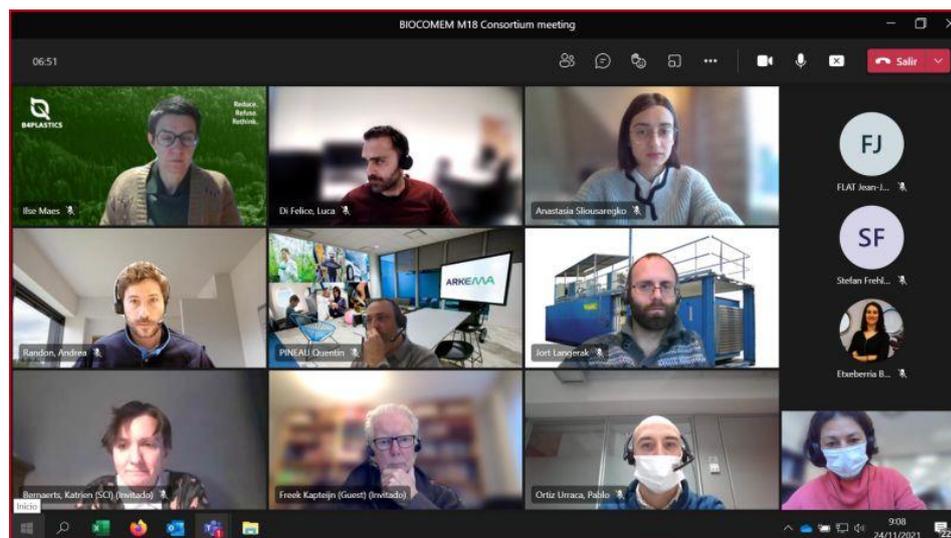
BIOCoMEM

BIO-BASED COPOLYMERS FOR MEMBRANE END PRODUCTS FOR GAS SEPARATIONS

H2020-BBI-JTI GRANT AGREEMENT NUMBER: 887075

NEWSLETTER Nr. 3

**30th November
2021**



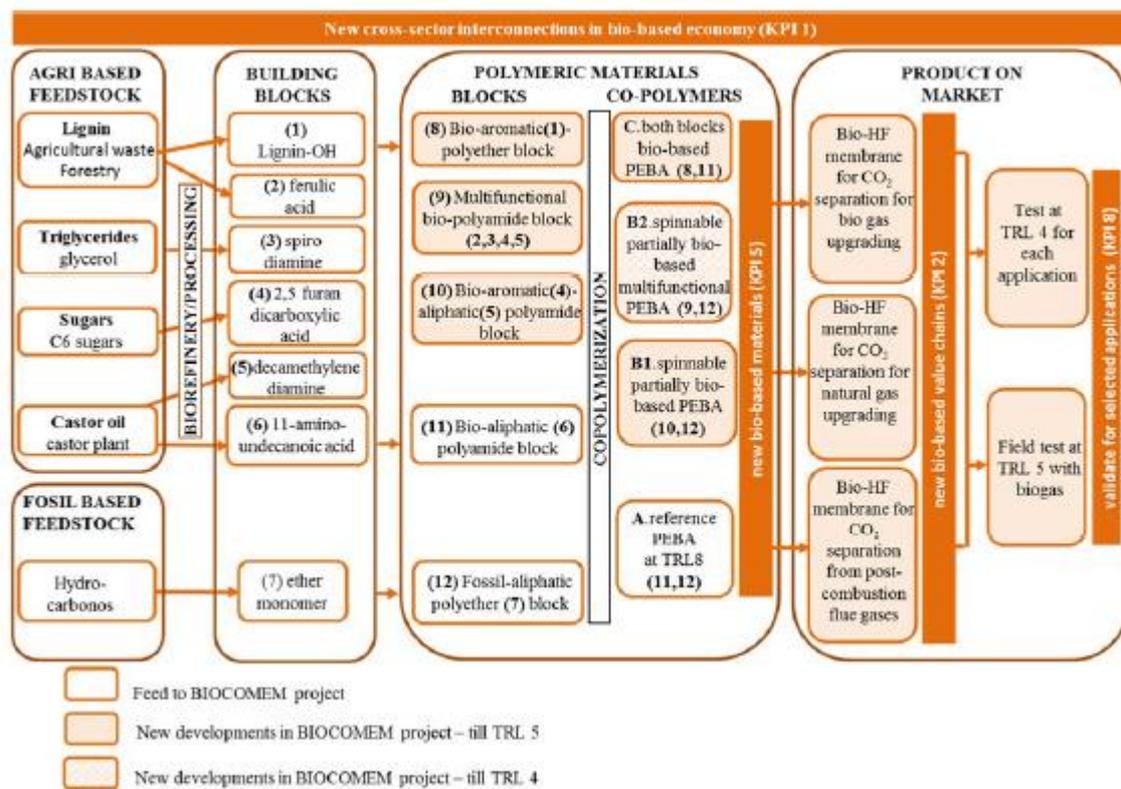
Editorial

Dear BioCoMem friends I am glad to welcome you to the third project newsletter! The last project meeting was held online at the end of November 2021, allowing all the consortium members to take stock of the situation.

As shown below, the core activities of the project are being carried out, developing the membrane prototypes in a synergic effort between the partners involved. These will be further integrated both in lab-scale membrane modules to be tested at TU/e facilities, and demonstration scale ones to be tested in an industrially relevant environment. Concerning the latter, also the activities related to the purchasing of components and the relative construction of the setup are going on.

At the same time Environmental performance of these technologies will be evaluated by Quantis, in order to demonstrate not only improved permeation performance and efficiency of the material but also environmental ones for the new bio-based technology. BioCoMem Project is glad to inform you about the main results achieved so far: the project developing is suffering of some delays due to covid-19 and a plan for boosting activities has been put into practice to recover the activities in the next months.

Here below you can see the overall concept of the Biocomem project concept in a “nutshell”; inside the scheme you can see the feedstock from which the new developments will bring the technology to both TRL4 and TRL5 levels.



BIOCOMEM concept in a “nutshell”.

Hoping pandemic setbacks will be overcome as soon as possible, BioCoMem people recommend you stay safe and enjoy the newsletter reading!

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Project Objectives

The overarching objective for the BIOCOMEM project is to demonstrate that membrane-based separation techniques using PEBA-type (Polyether block amide) copolymers are more efficient than their heat-based equivalent methods. This will reduce the overall environmental impact through a number of mechanisms. With this, the BIOCOMEM project has three specific objectives.

- First, to produce two new bio-based PEBA co-polymers at pilot scale. Each of these will be specifically designed to add value to three CO₂ separation market sectors: biogas upgrading, natural gas upgrading and post-combustion flue gas treatment.
- Second, to validate – again at pilot scale, in an industrially representative environment – a process for manufacturing three different gas separation hollow-fiber membranes that meet specific performance requirements.
- Third, to provide proof of principle that bio-based membranes can genuinely bring value to the gas separation market.

Partnership

Two partners of the BioCoMem consortium have left the project because of external causes. Fortunately substitutes have already been found! In order to achieve maximum impacts on the European industry, the BioCoMem consortium gathers 8 organisations from 4 countries including top level European Research Institutes, Universities and representative top industries in different sectors (4 SME and 1 IND). The consortium brings together multidisciplinary expertise of catalysts

synthesis, membranes development, chemical and process engineering development and construction of turn-key solution in the energy sector including operation and maintenance (i.e. biogas upgrading plants design), modelling and simulation, LCA and industrial risk study.

BioCoMem in progress

During the last six months of the project, with respect to the core activities, work has been carried out in the following areas:

- The development of Prototype B, a partially bio-based poly(ether-b-polyamide) based on a new polyamide that gives better solubility during hollow fiber membrane processing compared to the reference bio-PEBA. This prototype B is going to be upscaled by Arkema.
- Furthermore, we also developed a fully biobased poly(ether-b-polyamide) (prototype C), that was evaluated via dip coating at Tecnalia.

The purchasing and construction activities of the test rig at TU/e for testing the membrane prototypes at TRL 4 are being carried out, and they are on time with the scheduling of the project.



BIOCOMEM lab-scale setup under construction (TRL4).

Indeed, lab scale tests will be performed at TU/e for the three aimed applications. For this, three extra smaller membrane modules will be built. Also, all modules will be tested with accelerated aging tests, in which different types of gas mixtures including contaminants will be used as feed. The scope of these kind of tests is to assess the resistance of the membranes under chemical

attack. Moreover, the tests will be performed at different operating conditions in terms of temperature, pressures, and feed flow rates.

The BioCoMem Dissemination Activities and Events

First Dissemination Video



Industrial membrane modules showed in the Dissemination Video.

The first short video of BioCoMem outlining the concept of the project and the expected benefits from its implementation has been released. The video can be found in the website of the project (please see page 8) and in youtube at the following link:

<https://www.youtube.com/watch?v=PlsiiiS40rQ>

3rd Virtual Biocomem Consortium Meeting

Date 24th May 2021

The main objectives of the meeting were the assessment of the project's achievements (milestones and deliverables) and a plan for the next steps.

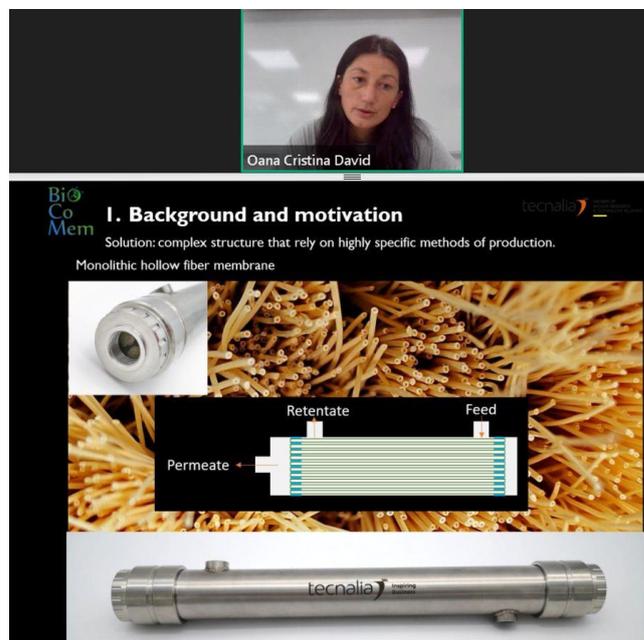
All the partners give their contribution to this great meeting and your efforts in the last 18 months to bring BIOCOMEM breakthrough bio-based membrane technology forward, despite difficult working conditions due to the pandemic. The meeting has been very intensive, and all the participants collaborate actively providing a friendly atmosphere and strengthening the relationships among the partners filling the gap of being effectively remoted connected.

Towards a more sustainable industrial chemistry model in Europe

Date: 18th May 2021

The European chemical industry is facing a new revolution. New concepts such as sustainability and circularity are needed in to overcome current limitations: product and process life cycle linearity, resource constraints, greenhouse gases and pollution, and decarbonization, among others. Biomass and biological feedstocks are projected to play a very important role in the upcoming future since they will replace their fossil-based versions. The program has shown successful initiatives about the development of biobased industries across Europe, and new opportunities to transform the production models according to the new economic and societal needs have been identified. Opportunities related to the manufacture of high value-added raw materials from renewable sources or by-products will be presented, by developing fully recycled and recyclable packaging materials, by developing bio-based materials for vehicle manufacturing, and by breaking down barriers to boost the commercialization of bio-based products. In the picture above you can see our project coordinator Oana David, presenting the BioCoMem project at the conference; title of the presentation was "Bio-based copolymers for membrane end products for gas separation". The conference was recorded, and the content can be found here:

<https://www.youtube.com/watch?v=3PNYLg1URuM>



Upcoming Events

Euromembrane Conference 2021

Date: 28 November – 2 December 2021

During Euromembrane's 4 days conference, more than 180 lectures and dozens of poster presentations will be presented. The conference will be held in plenary and 4 tracks. The Euromembrane 2021 conference includes all areas of membrane technology to be a meeting for the whole membrane society.

<https://euromembrane2021.eu/>



Biomembranes for gas permeation

Date: M24 of the project

Several public events and course will be implemented by BIOCOMEM partners and will be offered to interested stakeholders from academia and industry. One of the two public workshops will be on “Biomembranes for gas permeation”. It will be organized at TUE (M24), and it will be for a general audience.

1st Biocomem Review Meeting

Date: February 2022

The main objectives of the meeting will be the assessment of the project's achievements (milestones and deliverables and advancements) of what has been done in the first 18 months of the project. The partners hope the pandemic emergency will be finally over to meet in persons again. STAY TUNED!

<https://www.biocomem.eu/>

BIOCOMEM Website

Visit the BIOCOMEM project at the address – www.biocomem.eu and follow the project on LinkedIn and YouTube.

Let us have your comments!

The next issue of the Newsletter will be released in December 2021

Biocomem H2020 Project GRANT AGREEMENT N°: 887075

Biocomem 2020

The BIOCOMEM Researchers

Luca Di Felice



Dr. Luca di Felice holds a PhD in Chemical Engineering and Catalysis (2010) on the topic “CO₂ capture and catalytic steam reforming of tar produced in a fluidized bed steam gasification process” (joint PhD at the University of Strasbourg, France, and University of L’Aquila, Italy). In the last 12 years he has worked as researcher at EU-Joint Research Center (JRC), Eindhoven University of Technology (TU/e), CNRS-IRCE Lyon, Institute for Energy Technology (IFE). He has been recently appointed as researcher at TU/e (2020). He has been involved in diverse EU-projects related to membrane reactors, H₂ production, CO₂ absorption and separation processes (BIOCOMEM, DEMCAMER, ASCENT, MEMBER, CONVERGE, GLAMOUR, MACBETH) as researcher and project manager. He has published more than 25 peer reviewed articles and two book chapters in the fields of design, preparation and characterization of catalytic and non-catalytic materials, membrane technology, lab-scale testing, reactor modelling.

BIOCOMEM in figures:

- ✓ **8 partners**
- ✓ **5 countries**
- ✓ *3.1 M€ project*
- ✓ *Start June 2020*
- ✓ *Duration: **36 months***
- ✓ **Key Milestones:**
 - ❖ Development of two new PEBA co-polymers suitable for monolithic hollow fiber membrane production
 - ❖ Optimized recipe for HF membrane production by coating using reference bio-PEBA
 - ❖ Optimized recipe for HF membrane production by spinning using new aromatic/cycloaliphatic polyamide-b-polyether bio co-polymer
 - ❖ Optimized recipe for HF membrane production by spinning using new lignin-g-(polyether-b-polyamide 11) bio co-polymer

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More information on BIOCOMEM available at the project website:

<https://www.biocomem.eu/>